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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,936	10/10/2001	Craig P. Jacobson	IB-1405	1117

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[REDACTED] EXAMINER

KALAFUT, STEPHEN J

[REDACTED] ART UNIT [REDACTED] PAPER NUMBER

1745

DATE MAILED: 05/21/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	09/974,936	JACOBSON ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	Stephen J. Kalafut	1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
 THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-38 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-19 and 22-38 is/are rejected.
- 7) Claim(s) 20 and 21 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.
 

If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
  - a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                    | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                           | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>4.5</u> . | 6) <input type="checkbox"/> Other: _____                                     |

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Claims 4-6 and 31-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 4-6 recite particle sizes or porosities, but do not specify whether these are for the unsintered precursor or for the sintered product. Claims 31-33 recite that the electrolyte is a mixed ionic electronic conductor, but the electronic conductivity would short circuit the cell using the electrolyte.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 7-10, 13, 14, 16, 17, 19, 22, 23, 27, 28 and 34-38 are rejected under 35 U.S.C. 102(a) and (e) as being anticipated by Fasano *et al.* (US 6,051,330).

Fasano *et al.* disclose a method of making a solid oxide fuel cell, wherein the anode, electrolyte, cathode and interconnect layers are each formed, and then stacked, laminated and sintered (column 2, line 60 through column 3, line 14). Thus, a trilayer (anode, electrolyte, cathode) structure is formed on a substrate (the interconnect), provided and then sintered. The term “trilayer” is understood as not precluding the presence of additional layers, since it does not

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preclude the present substrate. The anode material may be a nickel oxide/yttria-stabilized-zirconia cermet, which is a MIEC material, while the cathode may be of doped lanthanum manganite, which is electrically conductive (column 1, lines 19-22). The electrolyte may be yttria-stabilized-zirconia (column 5, lines 34-35), while the interconnect (substrate) may include Inconel 600 (column 5, lines 59-60). Since these are the same materials as at present, any recited properties such as mutual non-reactivity between layers and ohmic resistivity would inherently accrue. The sintered electrolyte is no more than 5 percent porous (column 5, lines 12-16), which would be "greater than about 95 % densified". The thickness for each layer may be as little as 1 mil (25.4 microns). Sintering temperatures range from 1000 to 1500 °C (column 6, lines 31-33). As seen in figure 1, the trilayer structure would be planar.

Claims 1-3, 7, 10, 19, 27, 28, 34-37 and 38 are rejected under 35 U.S.C. 102(a) and (e) as being anticipated by Fasano *et al.* (US 6,051,173).

Fasano *et al.* disclose a method of making a solid oxide fuel cell, wherein the anode, electrolyte, cathode and interconnect layers are each formed, and then stacked, laminated and sintered (column 2, line 64 through column 3, line 31). Thus, a trilayer (anode, electrolyte, cathode) structure is formed on a substrate (the interconnect), provided and then sintered. The term "trilayer" is understood as not precluding the presence of additional layers, since it does not preclude the present substrate. The electrolyte may be yttria-stabilized-zirconia (column 4, lines 18-21). The anode material may be a nickel oxide/yttria-stabilized-zirconia cermet, which is a MIEC material (column 4, lines 24-28), while the cathode may be of doped lanthanum manganite, which is electrically conductive (column 1, lines 31-32). Since these are the same

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materials as at present, any recited properties such as non-reactivity between layers and ohmic resistivity would inherently accrue. As seen in figure 1, the trilayer structure would be planar.

Claims 1, 16-19, 37 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Armstrong *et al.* (US 5,286,322).

Armstrong *et al.* disclose a method of making a solid oxide fuel cell, in which a trilayer tape is formed, from anode, electrolyte and cathode layers (column 44-49), and combined with another tape (anode-interconnect-cathode) to form the fuel cell when both are sintered (column 2, lines 51-61). The electrolyte may be as thin as 0.002 centimeters, which is 20 microns (column 4, lines 39-43). Each tape would be planar.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11, 12, 15, 24-27, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fasano *et al.* (US 6,051,330).

These claims differ from Fasano *et al.* by reciting specific sintering temperatures, a final electrolyte porosity of at most 2 percent, and various materials for the electrodes, electrolyte and interconnect (substrate). The recited sintering temperatures fall within the range disclosed by Fasano *et al.*, and thus would be a matter of optimization to the ordinary artisan. Likewise, since

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the crossover of gas through the electrolyte would short circuit the cell, the artisan would be motivated to render the electrolyte as nonporous as possible. Fasano *et al.* also teaches that "any of the many suitable ceramic materials available for SOFC" may be used as the electrode or electrolyte materials (column 5, lines 28-30), and gives guidelines for selecting the interconnect material (column 5, lines 36-58). Thus, these claims would be obvious over Fasano *et al.*

Claims 20 and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art does not disclose or render obvious the simultaneous sintering of tubular or hexagonal trilayer structures to make a fuel cell.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. McPheeeters *et al.* (US 5,882,809) disclose a solid oxide fuel cell with corrugated and flat ceramic sheets.

The disclosure is objected to because of the following informalities: On page 12, line 6, the "cathode" is numbered 266, but this numeral does not appear in figure 2C, which instead includes the numeral 256. The terms "anode" and "cathode" appear to be reverse in this same paragraph. Normally, the fuel electrode is called the "anode" and the oxidant electrode is called the "cathode". Appropriate correction is required.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is (703) 308-0433. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (703) 308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

sjk  
May 16, 2003

  
STEPHEN KALAFUT  
PRIMARY EXAMINER  
GROUP 1700  
